STIC Search Report
Biotech-Chem Library

STIC Database Tracking Number: 157676

TO: Shailendra Kumar **Location: 5c03 / 5c18** **Thursday, June 30, 2005** **Art Unit: 1621** **Phone: 571-272-0640** **Serial Number: 10 / 785301**	**From: Jan Delaval** **Location: Biotech-Chem Library** **Remsen 1a51** **Phone: 571-272-2504** **jan.delaval@uspto.gov**

Search Notes

Jan please

Access DB# 157676

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: S. Kumar Examiner #: 69594 Date: 6/28/05

Art Unit: 1621 Phone Number 30 2-0640 Serial Number: 10/785,301

Mail Box and Bldg/Room Location: REM 5C03 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Catalytic Transamidation and amide metathesis under moderate conditions.

Inventors (please provide full names): Shannon Stahl et. al.

Earliest Priority Filing Date: 2/24/03

1. Amide metathesis and transamidation reactions comprising reacting in a solvent at least two reactants, the reactants comprising at least two distinct amides, or at least one amide and at least one amine, in the presence of a metal-containing catalyst, at a temperature of about 250°C or less, wherein a reaction takes place and the reaction is selected from the group consisting of transamidation and amide metathesis reactions.

2. The reaction of claim 1, wherein the reactants are reacted at a temperature of about 150°C or less.

3. The reaction of claim 1, wherein the reactants are reacted at a temperature of from about 90°C to about 150°C.

4. The reaction of claim 1, wherein the reactants are reacted at a temperature of from about 90°C to about 250°C.

5. The reaction of claim 1, wherein the metal-containing catalyst is selected from the group consisting of amido-ligated transition or main group metals, transition metals bearing anionic ligands, main group metals bearing anionic ligands, Lewis acidic metal complexes, and combinations thereof.

6. The reaction of claim 1, wherein the reactants are reacted in an aromatic, non-polar, aprotic solvent.

Jan, 22504

6/30/05

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=> fil reg
FILE 'REGISTRY' ENTERED AT 14:23:44 ON 30 JUN 2005
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Property values tagged with IC are from the ZIC/VINITI data file
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STRUCTURE FILE UPDATES:   29 JUN 2005  HIGHEST RN 853295-05-3
DICTIONARY FILE UPDATES:  29 JUN 2005  HIGHEST RN 853295-05-3

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TSCA INFORMATION NOW CURRENT THROUGH JANUARY 18, 2005

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**********************************************************************
*                                                                    *
* The CA roles and document type information have been removed from *
* the IDE default display format and the ED field has been added,    *
* effective March 20, 2005.  A new display format, IDERL, is now     *
* available and contains the CA role and document type information.  *
*                                                                    *
**********************************************************************

Crossover limits have been increased.  See HELP CROSSOVER for details.

Experimental and calculated property data are now available. For more
information enter HELP PROP at an arrow prompt in the file or refer
to the file summary sheet on the web at:
http://www.cas.org/ONLINE/DBSS/registryss.html

=> => d ide can tot l90

L90  ANSWER 1 OF 6  REGISTRY  COPYRIGHT 2005 ACS on STN
RN   144026-79-9  REGISTRY
ED   Entered STN:  21 Oct 1992
CN   Methanesulfonic acid, trifluoro-, scandium(3+) salt (9CI)  (CA INDEX NAME)
OTHER NAMES:
CN   Scandium triflate
CN   Scandium trifluoromethanesulfonate
CN   Scandium tris(trifluoromethanesulfonate)
CN   Scandium(3+) triflate
CN   Scandium(III) triflate
CN   Scandium(III) trifluoromethanesulfonate
CN   Trifluoromethanesulfonic acid scandium(3+) salt
DR   551942-89-3
MF   C H F3 O3 S . 1/3 Sc
CI   COM
SR   CA
LC   STN Files:   BIOSIS, CA, CAPLUS, CASREACT, CEN, CHEMCATS, CSCHEM,
       TOXCENTER, USPAT2, USPATFULL
CRN  (1493-13-6)
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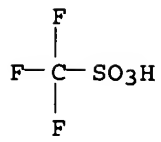


●1/3 Sc(III)

692 REFERENCES IN FILE CA (1907 TO DATE)
10 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
695 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:8120

REFERENCE 2: 142:481884

REFERENCE 3: 142:481631

REFERENCE 4: 142:463247

REFERENCE 5: 142:463241

REFERENCE 6: 142:447508

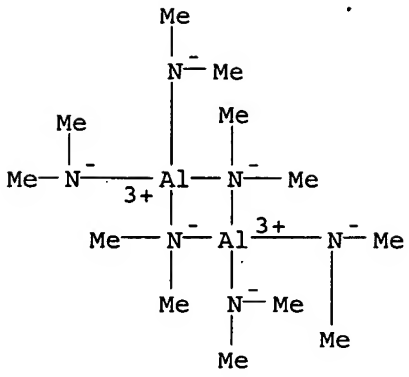
REFERENCE 7: 142:438642

REFERENCE 8: 142:430091

REFERENCE 9: 142:429983

REFERENCE 10: 142:422416

L90 ANSWER 2 OF 6 REGISTRY COPYRIGHT 2005 ACS on STN
RN **32093-39-3** REGISTRY
ED Entered STN: 16 Nov 1984
CN Aluminum, bis[μ-(N-methylmethanaminato)]tetrakis(N-methylmethanaminato)di- (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Aluminum, bis[μ-(dimethylaminato)]tetrakis(dimethylaminato)di- (8CI)
CN Aluminum, tris(dimethylamino)-, dimer (7CI)
CN Methanamine, N-methyl-, aluminum complex
OTHER NAMES:
CN Hexakis(dimethylamido)dialuminum
CN Tris(dimethylamino)alane dimer
MF **C12 H36 Al2 N6**
CI CCS
LC STN Files: CA, CAOLD, CAPLUS, CASREACT, CHEMCATS, CSCHEM, GMELIN*, USPAT2, USPATFULL
(*File contains numerically searchable property data)



40 REFERENCES IN FILE CA (1907 TO DATE)
40 REFERENCES IN FILE CAPLUS (1907 TO DATE)
1 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 142:307977

REFERENCE 2: 141:412742

REFERENCE 3: 141:387680

REFERENCE 4: 139:284784

REFERENCE 5: 139:223108

REFERENCE 6: 138:320705

REFERENCE 7: 137:178910

REFERENCE 8: 137:85712

REFERENCE 9: 137:25955

REFERENCE 10: 136:286888

L90 ANSWER 3 OF 6 REGISTRY COPYRIGHT 2005 ACS on STN
RN **7440-67-7** REGISTRY
ED Entered STN: 16 Nov 1984
CN **Zirconium (8CI, 9CI)** (CA INDEX NAME)
OTHER NAMES:
CN **zirconium**
CN Zirconium element
DR 141631-74-5, 141631-75-6, 141631-77-8, 182260-46-4
MF **Zr**
CI COM
LC STN Files: AGRICOLA, ANABSTR, AQUIRE, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB, DDFU, DETHERM*, DIOGENES, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NIOSHTIC, PIRA, PROMT, RTECS*, TOXCENTER, TULSA, ULIDAT, USPAT2, USPATFULL, VTB
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)

Zr

PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

67919 REFERENCES IN FILE CA (1907 TO DATE)
4551 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
67981 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:18811

REFERENCE 2: 143:18487

REFERENCE 3: 143:18425

REFERENCE 4: 143:17846

REFERENCE 5: 143:15165

REFERENCE 6: 143:15101

REFERENCE 7: 143:14350

REFERENCE 8: 143:14315

REFERENCE 9: 143:12938

REFERENCE 10: 143:12802

L90 ANSWER 4 OF 6 REGISTRY COPYRIGHT 2005 ACS on STN
RN **7440-32-6** REGISTRY
ED Entered STN: 16 Nov 1984
CN **Titanium (8CI, 9CI)** (CA INDEX NAME)
OTHER NAMES:
CN 38: PN: WO2005010031 SEQID: 38 claimed protein
CN Alpaste RTA 030
CN C.P. Titanium
CN DAT 1
CN DAT 5E
CN Dentcraft Titan Ingot
CN EBT
CN EBT (metal)
CN Elgard 210
CN M 350
CN M 350 (metal)
CN N 233
CN Smelloff-Cutter Titanium
CN TB 340
CN TC 459
CN TG-Tv
CN Timet 115
CN Titan 100
CN Titan 20A
CN Titanium element
CN Titanium fulleride (TiC20)
CN Tiunite
CN TP 270H
CN TPS 350

CN TR 28C
CN Tritan Til/31
CN Tritanium
CN TW 340
CN Ventron 00901
DR 53549-90-9, 54319-51-6, 57854-37-2, 62650-70-8, 67796-94-5, 182260-48-6, 195161-81-0
MF **Ti**
CI COM
LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, CSNB, DDFU, DETHERM*, DIOGENES, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NIOSHTIC, PIRA, PROMT, RTECS*, TOXCENTER, TULSA, ULIDAT, USPAT2, USPATFULL, VTB
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)

Ti

PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

154055 REFERENCES IN FILE CA (1907 TO DATE)
6627 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
154300 REFERENCES IN FILE CAPLUS (1907 TO DATE)

REFERENCE 1: 143:18819

REFERENCE 2: 143:18811

REFERENCE 3: 143:18786

REFERENCE 4: 143:18619

REFERENCE 5: 143:18596

REFERENCE 6: 143:18566

REFERENCE 7: 143:18562

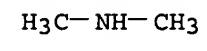
REFERENCE 8: 143:18425

REFERENCE 9: 143:18295

REFERENCE 10: 143:18090

L90 ANSWER 5 OF 6 REGISTRY COPYRIGHT 2005 ACS on STN
RN **3275-24-9** REGISTRY
ED Entered STN: 16 Nov 1984
CN Methanamine, N-methyl-, titanium(4+) salt (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:
CN Dimethylamine, titanium(4+) salt (8CI)
CN Titanium, tetrakis(dimethylamino)- (6CI, 7CI)
OTHER NAMES:
CN TDMAT
CN Tetra(dimethylamino)titanium

CN Tetrakis(dimethylamido)titanium
CN Tetrakis(dimethylamido)titanium(IV)
CN Tetrakis(dimethylamino)titanium
CN Tetrakis(N-methylmethanaminato)titanium
CN Titanium octamethyltetraamide
CN Titanium tetra(N,N-dimethylamide)
CN Titanium tetradimethylamide
CN Titanium tetradimethylamine
CN Titanium tetrakis(dimethylamide)
CN Titanium(4+) dimethylamide
DR 701980-89-4, 12541-08-1, 7229-79-0, 15050-40-5, 139984-20-6, 71400-78-7, 34870-82-1, 41291-74-1, 245655-35-0
MF **C2 H7 N . 1/4 Ti**
CI COM
LC STN Files: BEILSTEIN*, BIOSIS, CA, CAOLD, CAPLUS, CASREACT, CHEMCATS, CHEMLIST, CIN, CSCHEM, DETHERM*, IFICDB, IFIPAT, IFIUDB, MSDS-OHS, PIRA, TOXCENTER, USPAT2, USPATFULL
(*File contains numerically searchable property data)
Other Sources: EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)
CRN (124-40-3)



●1/4 Ti(IV)

653 REFERENCES IN FILE CA (1907 TO DATE)
8 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
656 REFERENCES IN FILE CAPLUS (1907 TO DATE)
18 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 143:7550

REFERENCE 2: 142:492687

REFERENCE 3: 142:474783

REFERENCE 4: 142:472924

REFERENCE 5: 142:421534

REFERENCE 6: 142:402271

REFERENCE 7: 142:377795

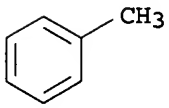
REFERENCE 8: 142:307945

REFERENCE 9: 142:289649

REFERENCE 10: 142:287996

L90 ANSWER 6 OF 6 REGISTRY COPYRIGHT 2005 ACS on STN
RN **108-88-3** REGISTRY
ED Entered STN: 16 Nov 1984
CN Benzene, methyl- (9CI) (CA INDEX NAME)
OTHER CA INDEX NAMES:

CN **Toluene (8CI)**
OTHER NAMES:
CN 1-Methylbenzene
CN Antisal 1a
CN CP 25
CN CP 25 (solvent)
CN Methacide
CN Methylbenzene
CN Methylbenzol
CN NSC 406333
CN Phenylmethane
CN Toluol
FS 3D CONCORD
MF C7 H8
CI COM
LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB, DDFU, DETHERM*, DIOGENES, DIPPR*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN*, HODOC*, HSDB*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM*, PIRA, PROMT, PS, RTECS*, SPECINFO, SYNTHLINE, TOXCENTER, TULSA, ULIDAT, USPAT2, USPATFULL, VETU, VTB
(*File contains numerically searchable property data)
Other Sources: DSL**, EINECS**, TSCA**
(**Enter CHEMLIST File for up-to-date regulatory information)



PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT

81615 REFERENCES IN FILE CA (1907 TO DATE)
921 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA
81759 REFERENCES IN FILE CAPLUS (1907 TO DATE)
24 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 143:18909

REFERENCE 2: 143:18902

REFERENCE 3: 143:18894

REFERENCE 4: 143:18891

REFERENCE 5: 143:18882

REFERENCE 6: 143:18880

REFERENCE 7: 143:18748

REFERENCE 8: 143:18605

REFERENCE 9: 143:17316

REFERENCE 10: 143:16314

=> d his

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     (FILE 'HOME' ENTERED AT 13:27:00 ON 30 JUN 2005)
                SET COST OFF

     FILE 'HCAPLUS' ENTERED AT 13:27:15 ON 30 JUN 2005
L1             1 S (US20040230078/PN OR (US2004-785301# OR US2003-449975#)/AP,PR
                 E STAHL S/AU
L2           116 S E3,E6,E13,E14
                 E GELLMAN S/AU
L3           203 S E4-E7
                 E ELDRED S/AU
L4             5 S E4,E5
                 SEL RN L1

     FILE 'REGISTRY' ENTERED AT 13:30:10 ON 30 JUN 2005
L5            19 S E1-E19
L6             3 S L5 AND (SC OR AL OR TI)/ELS
L7             5 S 1493-13-6/CRN AND SC/ELS
L8             3 S L7 NOT (NC5-C6-C6 OR C6-C6)/ES
L9            17 S 124-40-3/CRN AND TI/ELS
                 SEL RN 12-15 17
L10            5 S E20-E24
                 E C12H36AL2N6/MF
L11            1 S E3
L12            9 S L6,L8,L10,L11
L13            9 S (ALUMINUM OR LANTHANUM OR SCANDIUM OR TANTALUM OR TIN OR TITA
L14         1339 S (LA OR TA OR TI OR Y OR AL OR SC OR SN OR YB OR ZR)/MF
L15          456 S L14 NOT (MASS OR ISOTOPE)
L16           18 S 124-40-3/CRN AND ZR/ELS
L17           12 S 124-40-3/CRN AND TA/ELS
L18            3 S L16 AND 2/NC
L19            1 S 19756-04-8
L20            1 S 19824-59-0
L21          292 S 999-97-3/CRN
L22           50 S L21 AND (LI OR NA OR K OR ZN)/ELS
L23            5 S L22 AND 2/NC
L24            4 S L23 NOT 6LI
L25           45 S L22 NOT L23
L26            1 S TOLUENE/CN
L27            1 S BENZENE/CN

     FILE 'HCAPLUS' ENTERED AT 13:47:49 ON 30 JUN 2005
                 E TRANSAMIDAT/CT
L28            1 S E5
                 E E4+ALL
L29          136 S E2
L30          745 S E7
                 E E12,E14
                 E TRANSAMIDAT/CT
                 E E7+ALL
L31           57 S E8
L32           11 S E7
L33            1 S E9
L34            0 S E10
L35           13 S E11,E12
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L36          71 S E15-E17
L37           6 S E20;E22-E24
L38          66 S E27-E30
                E TRANSAMIDAT
L39         750 S E4-E10
                E METATHESIS/CT
L40        2947 S E3-E10
                E E3+ALL
L41        3719 S E4,E5
                E E9+ALL
L42        2059 S E5,E4
                E E8+ALL
                E E10+ALL
L43         258 S E4,E5
                E METATHE
L44       13336 S E24,E26,E27-E34
L45        3478 S E25,E35-E47
L46       16273 S L28-L45
L47      667255 S L12,L13,L15,L19,L20,L24
L48         296 S L46 AND L47
L49          11 S L48 AND L26,L27
                E AMIDES/CT
                E AMIDES, /CT
L50        8953 S E13,E14,E16
                E AMINES/CT
                E AMINES, /CT
L51       31690 S E17,E18,E20
L52       17465 S (AMIDES OR AMINES)/CT (L) PREP+NT/RL
L53        9793 S (AMIDES OR AMINES)/CT (L) PROC+NT/RL
L54          13 S L50-L53 AND L48
L55          23 S L49,L54
L56           2 S L1-L4 AND L55
L57         355 S (AMIDATION OR TRANSAMIDATION OR METATHESIS) AND L47
L58          37 S L50-L53 AND L57
L59          17 S L26,L27 AND L57
L60           2 S L1-L4 AND L48,L57
L61           2 S L1,L56,L60
L62          53 S L49,L55,L58,L59 NOT L61
L63          30 S L62 AND CATALY?
L64          44 S L62 AND (PD<=20030224 OR PRD<=20030224 OR AD<=20030224)
L65          15 S L64 AND (CARBOXAMIDE OR LIGAND OR SURFACTANT OR CARBAMATE OR
                SEL DN AN 13
L66           1 S L65 AND E1-E3
L67           3 S L61,L66
L68         217 S SC OTF 3
L69         184 S TI NME2 4
L70           7 S AL2 NME2 6
L71          99 S ZR NME2 4
L72          33 S TA NME2 5
L73           0 S LI NTMS
L74           0 S LI NTMS2
L75           0 S NA NTMS2
L76           0 S K NTMS2
L77           1 S ZN NTMS2
L78          23 S L68-L77 AND L46
L79          28 S L68-L77 AND L50-L53
L80          18 S (AMIDATION OR TRANSAMIDATION OR METATHESIS) AND L68-L77
L81          50 S L78-L80
L82          49 S L81 NOT L64,L67
L83          34 S L82 AND (PD<=20030224 OR PRD<=20030224 OR AD<=20030224)
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L84           4 S L83 AND (THREE COMPONENT OR PRECATALYST)/TI
L85           1 S L81 NOT L82
L86           7 S L67,L84,L85
L87           7 S L86 AND L1-L4,L28-L86
L88           7 S L87 AND (AMIDAT? OR AMINE? OR AMIDE? OR METATHE?)/CT,CW

     FILE 'REGISTRY' ENTERED AT 14:23:44 ON 30 JUN 2005

     FILE 'HCAPLUS' ENTERED AT 14:24:05 ON 30 JUN 2005
                SEL RN L88

     FILE 'REGISTRY' ENTERED AT 14:24:10 ON 30 JUN 2005
L89         107 S E4-E110
L90           6 S L89 AND L12,L13,L15,L19,L20,L24,L26,L27
L91         101 S L89 NOT L90

=> fil hcaplus
FILE 'HCAPLUS' ENTERED AT 14:27:00 ON 30 JUN 2005
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FILE LAST UPDATED: 29 Jun 2005  (20050629/ED)

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 This file contains CAS Registry Numbers for easy and accurate
 substance identification.

=> d l88 all hitstr tot

L88  ANSWER 1 OF 7  HCAPLUS  COPYRIGHT 2005 ACS on STN
AN   2004:999711  HCAPLUS
DN   141:412742
ED   Entered STN:  19 Nov 2004
TI   Catalytic transamidation and carboxamide metathesis
     under moderate conditions
IN   Stahl, Shannon S.; Gellman, Samuel H.; Eldred,
     Sarah E.
PA   USA
SO   U.S. Pat. Appl. Publ., 11 pp.
     CODEN: USXXCO
DT   Patent
LA   English
IC   ICM  C07C235-02
INCL 564123000
CC   45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)
     Section cross-reference(s): 67
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FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004230078	A1	20041118	US 2004-785301	20040224 <--
PRAI	US 2003-449975P	P	20030224 <--		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004230078	ICM	C07C235-02
	INCL	564123000
US 2004230078	NCL	564/123.000 <--

OS CASREACT 141:412742

AB A method of manipulating the carboxamide functionality in a catalytic manner is described comprising reacting amides (e.g., heptanilide) with or without amines (e.g., benzylamine) in the presence of various types of metal catalysts (e.g., scandium tritriflate) at ≤250° (e.g., producing aniline and N-benzylheptanamide).

ST catalytic **transamidation** carboxamide **metathesis**

IT **Metathesis**
Metathesis catalysts
(catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT **Amides, preparation**
Amines, preparation
Anilides
RL: **IMF (Industrial manufacture)**; RCT (Reactant); **PREP (Preparation)**; RACT (Reactant or reagent)
(catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT **Amides, preparation**
RL: **IMF (Industrial manufacture)**; RCT (Reactant); **PREP (Preparation)**; RACT (Reactant or reagent)
(secondary; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT **Amidation catalysts**
(**transamidation** catalysts; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT **Amidation**
(**transamidation**; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT **3275-24-9 32093-39-3 144026-79-9**, Scandium triflate
RL: CAT (Catalyst use); USES (Uses)
(catalyst; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT 62-53-3P, Aniline, preparation 55917-07-2P 90934-70-6P 128007-45-4P 512173-22-7P 512173-23-8P 512173-24-9P
RL: IMF (Industrial manufacture); PREP (Preparation)
(catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

IT 100-46-9P, Benzylamine, preparation 104-94-9P, 4-Aminoanisole 106-49-0P, 4-Aminotoluene, preparation 20172-34-3P
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)
(catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

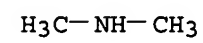
IT 107-11-9, Allyl amine 107-85-7 109-85-3 56051-98-0, Heptanoic anilide
RL: RCT (Reactant); RACT (Reactant or reagent)
(catalytic **transamidation** and carboxamide **metathesis**

under moderate conditions)

IT **108-88-3**, Toluene, uses
RL: NUU (Other use, unclassified); USES (Uses)
(solvent; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

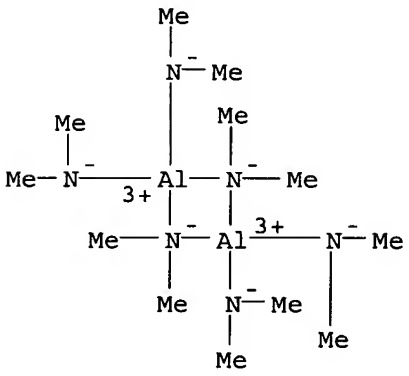
IT **3275-24-9 32093-39-3 144026-79-9**, Scandium triflate
RL: CAT (Catalyst use); USES (Uses)
(catalyst; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

RN 3275-24-9 HCAPLUS
CN Methanamine, N-methyl-, titanium(4+) salt (9CI) (CA INDEX NAME)

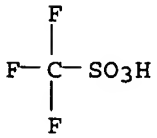


●1/4 Ti(IV)

RN 32093-39-3 HCAPLUS
CN Aluminum, bis[μ-(N-methylmethanaminato)]tetrakis(N-methylmethanaminato)di- (9CI) (CA INDEX NAME)



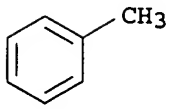
RN 144026-79-9 HCAPLUS
CN Methanesulfonic acid, trifluoro-, scandium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Sc(III)

IT **108-88-3**, Toluene, uses
RL: NUU (Other use, unclassified); USES (Uses)
(solvent; catalytic **transamidation** and carboxamide **metathesis** under moderate conditions)

RN 108-88-3 HCAPLUS
CN Benzene, methyl- (9CI) (CA INDEX NAME)



L88 ANSWER 2 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2003:155386 HCAPLUS
DN 138:320705
ED Entered STN: 02 Mar 2003
TI Catalytic **Transamidation** under Moderate Conditions
AU **Eldred, Sarah E.**; Stone, David A.; **Gellman, Samuel H.**; **Stahl, Shannon S.**
CS Department of Chemistry, University of Wisconsin-Madison, Madison, WI, 53706, USA
SO Journal of the American Chemical Society (2003), 125(12), 3422-3423
CODEN: JACSAT; ISSN: 0002-7863
PB American Chemical Society
DT Journal
LA English
CC 21-2 (General Organic Chemistry)
OS CASREACT 138:320705
AB Whereas the carboxamide group is generally inert, except under harsh conditions or in the presence of highly evolved enzymes, some Lewis acids and metal amides, such as scandium triflate, **Ti(NMe2)4**, or **Al2(NMe2)6**, efficiently catalyzed **transamidation** reactions of amide/amine mixts. under moderate conditions. For example, treatment of N-Ph heptanamide with primary alkyl amines RNH2 (R = H2C:CH, Me2CHCH2CH2, MeOCH2CH2, PhCH2) in the presence of **Sc(OTf)3** or **Ti(NMe2)4** gave aniline and the corresponding N-alkyl heptanamides in 88-98% yields. Thermonuclear exchange reactions between alkyl amines and N-alkyl heptanamides or between aryl amines and N-aryl heptanamides were also studied.
ST amide catalytic **transamidation** amine metal Lewis acid catalyst; amine amide exchange reaction metal catalyst
IT **Amidation catalysts**
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT **Amides, preparation**
Amines, preparation
RL: RCT (Reactant); **SPN (Synthetic preparation)**; **PREP (Preparation)**; RACT (Reactant or reagent)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT **Amidation**
(**transamidation**; Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT **3275-24-9**, Tetrakis(dimethylamido)titanium **32093-39-3** **144026-79-9**, Scandium triflate
RL: CAT (Catalyst use); USES (Uses)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT 104-94-9, 4-Methoxyaniline 107-11-9, Allylamine 109-85-3,

2-Methoxyethyl amine 56051-98-0, N-Phenyl heptanamide
RL: RCT (Reactant); RACT (Reactant or reagent)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT 100-46-9P, Benzylamine, preparation 106-49-0P, 4-Methylaniline, preparation 107-85-7P, 3-Methylbutanamine 20172-34-3P 55917-07-2P 512173-22-7P 512173-24-9P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
IT 62-53-3P, Aniline, preparation 128007-45-4P 512173-23-8P
RL: SPN (Synthetic preparation); PREP (Preparation)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
RE.CNT 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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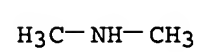
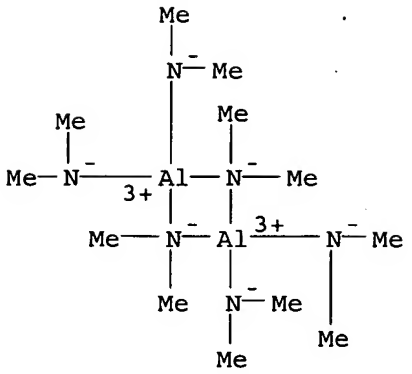
IT **3275-24-9**, Tetrakis(dimethylamido)titanium **32093-39-3** **144026-79-9**, Scandium triflate
RL: CAT (Catalyst use); USES (Uses)
(Lewis acid or metal amide catalyzed **transamidation** of N-alkyl or N-aryl heptanamides with aliphatic or aromatic amines)
RN 3275-24-9 HCAPLUS
CN Methanamine, N-methyl-, titanium(4+) salt (9CI) (CA INDEX NAME)

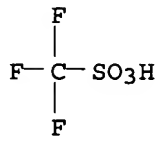


●1/4 Ti(IV)

RN 32093-39-3 HCAPLUS
CN Aluminum, bis[μ-(N-methylmethanaminato)]tetrakis(N-methylmethanaminato)di- (9CI) (CA INDEX NAME)



RN 144026-79-9 HCAPLUS
CN Methanesulfonic acid, trifluoro-, scandium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Sc(III)

L88 ANSWER 3 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2002:791434 HCAPLUS
DN 139:213849
ED Entered STN: 18 Oct 2002
TI **Ti(NMe2)4** as a **precatalyst** for hydroamination of alkynes with primary amines. [Erratum to document cited in CA135:303457]
AU Shi, Yanhui; Ciszewski, James T.; Odom, Aaron L.
CS Department of Chemistry, michigan State University, East Lansing, MI, 48824, USA
SO Organometallics (**2002**), 21(23), 5148
CODEN: ORGND7; ISSN: 0276-7333
PB American Chemical Society
DT Journal
LA English
CC 21-2 (General Organic Chemistry)
AB The method used for workup and anal. of hydroaminatino reactions involving one substrate in Table 1 led to a misinterpretation of regioselectivities. Table 1, with correction of rows 3 and 7, is reprinted. The adjusted regioselectivities were found to be consistent using a combination of GC/FID on crude reaction mixts., in comparison with authentic samples, and 1H NMR on isolated products. Isolations were done on the imines where possible to get consistent results. Otherwise, the products were reduced by lithium aluminum hydride in THF, and the corresponding amines were isolated. The yields are of isolated products.
ST erratum titanium tetrakisdimethylamide hydroamination catalyst alkyne amine
IT Amination
Amination catalysts

(reductive; titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines (Erratum))

IT Alkynes
Amines, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines (Erratum))

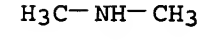
IT 1749-19-5P 3723-13-5P 14548-16-4P 38407-00-0P 40475-58-9P
63459-02-9P 117555-73-4P 133527-55-6P 150666-72-1P 289507-90-0P
367279-80-9P 367279-81-0P 367279-82-1P 367279-83-2P 367279-84-3P
367279-85-4P 367279-86-5P 367279-87-6P 367279-88-7P 367279-89-8P
367279-90-1P 367279-91-2P 367279-92-3P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of (Erratum))

IT **3275-24-9**, Titanium tetrakis(dimethylamide)
RL: CAT (Catalyst use); USES (Uses)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines (Erratum))

IT 62-53-3, Benzenamine, reactions 75-64-9, reactions 91-00-9 100-46-9, Benzenemethanamine, reactions 104-94-9 106-49-0, reactions 501-65-5 536-74-3 536-90-3 579-66-8 626-43-7 693-02-7, 1-Hexyne 771-60-8 928-49-4, 3-Hexyne
RL: RCT (Reactant); RACT (Reactant or reagent)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines (Erratum))

IT **3275-24-9**, Titanium tetrakis(dimethylamide)
RL: CAT (Catalyst use); USES (Uses)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines (Erratum))

RN 3275-24-9 HCAPLUS
CN Methanamine, N-methyl-, titanium(4+) salt (9CI) (CA INDEX NAME)



●1/4 Ti(IV)

L88 ANSWER 4 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 2001:583904 HCAPLUS
DN 135:303457
ED Entered STN: 14 Aug 2001
TI **Ti(NMe2)4** as a **Precatalyst** for Hydroamination of Alkynes with Primary Amines
AU Shi, Yanhui; Ciszewski, James T.; Odom, Aaron L.
CS Department of Chemistry, Michigan State University, East Lansing, MI, 48824, USA
SO Organometallics (**2001**), 20(19), 3967-3969
CODEN: ORGND7; ISSN: 0276-7333
PB American Chemical Society
DT Journal
LA English
CC 21-2 (General Organic Chemistry)
OS CASREACT 135:303457
AB Hydroaminations of carbon-carbon triple bonds with primary amines are catalyzed with com. available **Ti(NMe2)4**.
Thus, 1-hexyne undergoes hydroamination with benzylamine to give 90% of a

3:1 mixture of Markovnikov and anti-Markovnikov products. The reaction is surprisingly fast with many substrates and often selective for the Markovnikov product with terminal alkynes. The scope of the catalysis was investigated with a variety of amines and alkynes; arylamines and 1-hexyne were found to be especially good substrates.

ST titanium tetrakisdimethylamide hydroamination catalyst alkyne amine

IT Amination
Amination catalysts
(reductive; titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines)

IT Alkynes
Amines, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines)

IT 1749-19-5P 3723-13-5P 14548-16-4P 38407-00-0P 40475-58-9P
63459-02-9P 117555-73-4P 133527-55-6P 150666-72-1P 289507-90-0P
367279-80-9P 367279-81-0P 367279-82-1P 367279-83-2P 367279-84-3P
367279-85-4P 367279-86-5P 367279-87-6P 367279-88-7P 367279-89-8P
367279-90-1P 367279-91-2P 367279-92-3P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of)

IT **3275-24-9**, Titanium tetrakis(dimethylamide)
RL: CAT (Catalyst use); USES (Uses)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines)

IT 62-53-3, Benzenamine, reactions 75-64-9, reactions 91-00-9 100-46-9, Benzenemethanamine, reactions 104-94-9 106-49-0, reactions 501-65-5 536-74-3 536-90-3 579-66-8 626-43-7 693-02-7, 1-Hexyne 771-60-8 928-49-4, 3-Hexyne
RL: RCT (Reactant); RACT (Reactant or reagent)
(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines)

RE.CNT 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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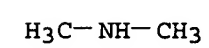
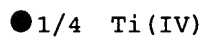
IT **3275-24-9**, Titanium tetrakis(dimethylamide)
RL: CAT (Catalyst use); USES (Uses)

(titanium tetrakis(dimethylamide) catalyzed hydroamination of alkynes with primary amines)
RN 3275-24-9 HCAPLUS
CN Methanamine, N-methyl-, titanium(4+) salt (9CI) (CA INDEX NAME)





L88 ANSWER 5 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 1998:88293 HCAPLUS
DN 128:167217
ED Entered STN: 16 Feb 1998
TI **Sc(OTf)3**-catalyzed **three-component** reactions of aldehydes, amines and allyltributylstannane in micellar systems. Facile synthesis of homoallylic amines in water
AU Kobayashi, Shu; Busujima, Tsuyoshi; Nagayama, Satoshi
CS Dep. Applied Chem., Fac. Sci., Sci. Univ. Tokyo (SUT), Tokyo, 162, Japan
SO Chemical Communications (Cambridge) (**1998**), (1), 19-20
CODEN: CHCOFS; ISSN: 1359-7345
PB Royal Society of Chemistry
DT Journal
LA English
CC 25-4 (Benzene, Its Derivatives, and Condensed Benzenoid Compounds)
AB Three-component reactions of aldehydes, amines and allyltributylstannane proceeded smoothly in water without using any organic solvents, in the presence of a small amount of scandium trifluoromethanesulfonate [**Sc(OTf)3**] and sodium dodecylsulfate (SDS), to afford the corresponding homoallylic amines in high yields.
ST homoallylic amine prepn catalyst
IT Catalysts
(preparation of homoallylic amines in micellar systems)
IT Aldehydes, reactions
RL: PRP (Properties); RCT (Reactant); RACT (Reactant or reagent)
(preparation of homoallylic amines in micellar systems)
IT **Amines, preparation**
RL: **SPN (Synthetic preparation); PREP (Preparation)**
(preparation of homoallylic amines in micellar systems)
IT **144026-79-9**
RL: CAT (Catalyst use); USES (Uses)
(preparation of homoallylic amines in micellar systems)
IT 62-53-3, Phenylamine, reactions 98-01-1, 2-Furancarboxaldehyde, reactions 98-03-3, 2-Thiophenecarboxaldehyde 100-52-7, Benzaldehyde, reactions 104-53-0, Benzenepropanal 104-88-1, 4-Chlorobenzaldehyde, reactions 104-94-9, 4-MethoxyPhenylamine 106-47-8, 4-ChloroPhenylamine, reactions 124-19-6, Nonanal 1074-12-0 2043-61-0, Cyclohexanecarboxaldehyde 14371-10-9
RL: RCT (Reactant); RACT (Reactant or reagent)
(preparation of homoallylic amines in micellar systems)
IT 66489-79-0P 150562-30-4P 178983-06-7P 181762-18-5P 197147-29-8P 202875-32-9P 202875-33-0P 202875-34-1P 202875-35-2P 202875-36-3P 202875-37-4P 202875-38-5P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of homoallylic amines in micellar systems)
RE.CNT 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
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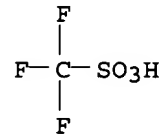
IT **144026-79-9**
RL: CAT (Catalyst use); USES (Uses)
(preparation of homoallylic amines in micellar systems)
RN 144026-79-9 HCAPLUS
CN Methanesulfonic acid, trifluoro-, scandium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Sc(III)

L88 ANSWER 6 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN 1995:639369 HCAPLUS
DN 123:227961
ED Entered STN: 27 Jun 1995
TI Ln(OTf)3- or **Sc(OTf)3**-catalyzed **three component** coupling reactions between aldehydes, amines, and dienes or alkenes. Efficient syntheses of pyridine and quinoline derivatives
AU Kobayashi, Shu; Ishitani, Haruro; Nagayama, Satoshi
CS Dep. Applied Chemistry, Science Univ., Tokyo, 162, Japan
SO Chemistry Letters (**1995**), (6), 423-24
CODEN: CMLTAG; ISSN: 0366-7022
PB Nippon Kagakkai
DT Journal
LA English
CC 27-17 (Heterocyclic Compounds (One Hetero Atom))
OS CASREACT 123:227961
AB Three components coupling reactions between aldehydes, amines, and dienes or alkenes were catalyzed by lanthanide or scandium triflate to afford pyridine and quinoline derivs. in high yields. The Lewis acid catalysts were stable and kept their activity even in the presence of water and

amines.

ST coupling reaction aldehyde amine alkene alkadiene; pyridine deriv; ytterbium catalyst coupling reaction; quinoline deriv; scandium catalyst coupling reaction

IT Coupling reaction
Coupling reaction catalysts
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

IT Aldehydes, reactions
Alkadienes
Alkenes, reactions
Amines, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

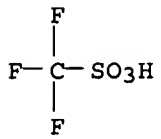
IT 62-53-3, Aniline, reactions 90-04-0, o-Methoxyaniline 100-52-7, Benzaldehyde, reactions 104-94-9, p-Methoxyaniline 109-92-2, Ethoxyethene 116-11-0 513-81-5, 2,3-Dimethyl-1,3-butadiene 542-92-7, Cyclopentadiene, reactions 783-08-4 922-68-9, Methyl oxoacetate 1074-12-0, Phenylglyoxal 1822-73-7, (Phenylthio)ethene 54125-02-9 54761-04-5, Ytterbium triflate **144026-79-9**, Scandium triflate
RL: RCT (Reactant); RACT (Reactant or reagent)
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

IT 168326-40-7P
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

IT 4789-76-8P 5568-58-1P 21086-06-6P 84307-76-6P 168326-39-4P 168326-41-8P 168326-42-9P 168326-43-0P 168326-44-1P 168326-45-2P 168326-46-3P 168326-47-4P 168326-48-5P
RL: SPN (Synthetic preparation); PREP (Preparation)
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

IT **144026-79-9**, Scandium triflate
RL: RCT (Reactant); RACT (Reactant or reagent)
(Ln(OTf)3- or **Sc(OTf)3**-catalyzed three component coupling reactions between aldehydes, amines, and dienes or alkenes)

RN 144026-79-9 HCAPLUS
CN Methanesulfonic acid, trifluoro-, scandium(3+) salt (9CI) (CA INDEX NAME)



●1/3 Sc(III)

L88 ANSWER 7 OF 7 HCAPLUS COPYRIGHT 2005 ACS on STN
AN **1994:557156** HCAPLUS
DN **121:157156**
ED Entered STN: 01 Oct 1994
TI **amidation** of carboxylic acids using supported transition metal **catalysts.**
IN Krogh, James A.; Mokadam, Anita R.; Smith, B. Brian
PA Exxon Chemical Patents, Inc., USA
SO PCT Int. Appl., 22 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C07C231-02
CC 23-18 (Aliphatic Compounds)
Section cross-reference(s): 67
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE	
PI	WO 9415905	A1	19940721	WO 1994-US233	19940103	<--
	W: CA					
	RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE					
	CA 2153173	AA	19940721	CA 1994-2153173	19940103	<--
	CA 2153173	C	20021217			
	EP 677038	A1	19951018	EP 1994-905601	19940103	<--
	EP 677038	B1	19980708			
	R: BE, DE, ES, FR, GB, IT, NL					
	ES 2120013	T3	19981016	ES 1994-905601	19940103	<--
	US 5587498	A	19961224	US 1994-314454	19940928	<--
PRAI	US 1993-63	A	19930104	<--		
	WO 1994-US233	W	19940103	<--		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES	
WO 9415905	ICM	C07C231-02	
WO 9415905	ECLA	C07C231/02	<--
US 5587498	NCL	554/069.000; 564/138.000; 564/141.000	
	ECLA	C07C231/02	<--

OS CASREACT 121:157156
AB Amides were prepared on a batch, continuous, or semicontinuous basis by reaction of a carboxylic acid with an amine (approx. 1:1 molar ratio) at 220-350° in the presence of ≥0.001 weight% of a **catalyst** containing a transition metal selected from Groups IVb, Vb, and VIb and bound to a solid support. Thus, neodecanoic acid and MeNH2 were heated at 220-250° and 300 psi in the presence of a Ti on clay **catalyst** for 15 h to give >90% yield of amide.
ST carboxylic acid **amidation** transition metal **catalyst**; carboxamide
IT **Amidation catalysts**
(Group IVb, Vb, and VIb metals on solid supports)
IT Bentonite, uses
RL: CAT (Catalyst use); USES (Uses)
(**catalyst**, for **amidation** of carboxylic acids)
IT Transition metals, uses
RL: CAT (Catalyst use); USES (Uses)
(**catalysts**, supported, for **amidation** reaction)
IT **Amidation**
(of carboxylic acids by ammonia or primary or secondary amines)
IT **Amides, preparation**
RL: **SPN (Synthetic preparation); PREP (Preparation)**

(preparation of, by supported transition metal-**catalyzed** **amidation** reaction)

IT 74-89-5, Methylamine, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(**amidation** by, of carboxylic acid, supported transition metal **catalysts** for)

IT 26896-20-8, Neodecanoic acid
RL: RCT (Reactant); RACT (Reactant or reagent)
(**amidation** of, supported transition metal **catalysts** for)

IT 546-68-9, Tyzor tpt 2171-98-4, Zirconium tetraisopropoxide
RL: CAT (Catalyst use); USES (Uses)
(**catalyst**, for **amidation** of carboxylic acids)

IT **7440-32-6**, Titanium, uses 7440-58-6, Hafnium, uses 7440-62-2, Vanadium, uses **7440-67-7**, Zirconium, uses
RL: CAT (Catalyst use); USES (Uses)
(**catalyst**, supported, for **amidation** of carboxylic acids)

IT 105726-67-8P
RL: SPN (Synthetic preparation); PREP (Preparation)
(preparation of, via supported transition metal-**catalyzed** **amidation**)

IT **7440-32-6**, Titanium, uses **7440-67-7**, Zirconium, uses
RL: CAT (Catalyst use); USES (Uses)
(**catalyst**, supported, for **amidation** of carboxylic acids)

RN 7440-32-6 HCAPLUS
CN Titanium (8CI, 9CI) (CA INDEX NAME)

Ti

RN 7440-67-7 HCAPLUS
CN Zirconium (8CI, 9CI) (CA INDEX NAME)

Zr

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